

## CLAIMS

WE CLAIM:

1. An integrated noise suppression acoustic panel, comprising:  
a back plate;  
a face plate; and  
a bulk foam absorber disposed between the back plate and the perforated face plate, the bulk foam absorber comprising a thermoset material.
2. The panel of Claim 1, further comprising:  
a plurality of open cells formed in the bulk foam absorber.
3. The panel of Claim 1, wherein the bulk foam absorber includes at least a first side that is at least partially coupled to the back plate and a second side that is at least partially coupled to the face plate.
4. The panel of Claim 1, wherein the bulk foam absorber has a density gradient between the first side and the second side.
5. The panel of Claim 4, wherein the density of the bulk foam absorber at the first side is greater than the density of the bulk foam absorber at the second side.
6. The panel of Claim 1, wherein the thermoset material is at least one of bismaleimide, a phenolic, an epoxy, or a polyimide.
7. The panel of Claim 1, wherein:  
the back plate is substantially imperforate; and  
the face plate is at least partially perforated.

8. The panel of Claim 1, wherein the bulk foam absorber further comprises a blowing agent.

9. The panel of Claim 1, wherein the blowing agent is at least one of a solid powder or a liquid.

10. The panel of Claim 1, wherein the foam bulk absorber further comprises a reinforcement material.

11. The panel of Claim 9, wherein the reinforcement material comprises a synthetic polymer fiber.

12. The panel of Claim 9, wherein the reinforcement material comprises a powdered carbon fiber.

13. A method of forming an open cell foam bulk absorber, comprising the steps of:

mixing a predetermined amount of a blowing agent with a predetermined amount of a foamable material to obtain a mixture thereof;

heating the mixture to at least a predetermined cure temperature at which the blowing agent will decompose; and

maintaining the mixture at the predetermined cure temperature for a predetermined cure time.

14. The method of Claim 13, further comprising:

melting the foamable material prior to mixing it with the blowing agent.

15. The method of Claim 13, further comprising:

melting at least the foamable material after mixing it with the blowing agent.

16. The method of Claim 13, further comprising:

after the predetermined cure time, cooling the mixture for a predetermined time period.

17. The method of Claim 13, further comprising:

before heating the mixture to the predetermined cure temperature, increasing the temperature of the mixture to a predetermined temperature for a predetermined reheat time period.

18. The method of Claim 13, further comprising:

subjecting the mixture to a predetermined vacuum pressure magnitude for a predetermined time period.

19. The method of Claim 18, further comprising:  
repeatedly subjecting the mixture to the predetermined vacuum pressure magnitude for the predetermined time period a predetermined number of times.

20. The method of Claim 13, further comprising:  
mixing a predetermined amount of a reinforcement material with the blowing agent and the foamable material to obtain the mixture.

21. The method of Claim 20, wherein the reinforcement material is a synthetic polymer fiber.

22. The method of Claim 21, wherein the predetermined amount of reinforcement material is in the range of about 0.25% to about 3.0% of foamable material weight.

23. The method of Claim 21, wherein the predetermined amount of reinforcement material is about 0.5% of foamable material weight.

24. The method of Claim 20, wherein the reinforcement material is a powdered carbon fiber.

25. The method of Claim 24, wherein the predetermined amount of reinforcement material is in the range of about 0.5% to about 3.0% of foamable material weight.

26. The method of Claim 24, wherein the predetermined amount of reinforcement material is about 1.0% of foamable material weight.

27. The method of Claim 13, wherein the foamable material comprises a thermoset material.

28. The method of Claim 27, wherein the thermoset material comprises bismaleimide.

29. The method of Claim 27, wherein the thermoset material comprises a material selected from the group consisting of a phenolic, an epoxy, and a polyimide.

30. The method of Claim 13, wherein the foamable material comprises a ceramic powder compound.

31. The method of Claim 30, wherein the ceramic powder compound is selected from the group consisting of alumina and zirconia.

32. The method of Claim 13, wherein the foamable material comprises a metal powder compound.

33. The method of Claim 32, wherein the metal powder compound is selected from the group consisting of stainless steel, carbonyl iron, and nickel powder compounds.

34. The method of Claim 13, wherein the predetermined amount of blowing agent is in the range of about 3% to about 10% of foamable material weight.

35. The method of Claim 13, wherein the predetermined amount of blowing agent is about 5% of foamable material weight.

36. The method of Claim 13, wherein each of the steps is performed at or below atmospheric pressure.